

CONSULTATION PAPER ON THE DIGITAL ENTERPRISE BLUEPRINT

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CONSULTATION PAPER ON THE DIGITAL ENTERPRISE BLUEPRINT

1 The Ministry of Communications and Information (MCI) is developing a Digital Enterprise Blueprint (DEB) to chart the next bound of digitalisation for enterprises, amidst a rapidly evolving technological landscape and fast-growing digital economy.

2 In the process of developing the DEB, MCI has consulted extensively with industry and trade association partners including SGTech, Singapore Computer Society (SCS), Singapore Business Federation, Association of Information Security Professionals (AiSP), Information Systems Audit and Control Association (ISACA), and the Association of Trade and Commerce Singapore; as well as enterprises from the Infocomm Media Development Authority (IMDA)'s Digital Leaders' Programme (DLP), and the Cyber Security Agency of Singapore (CSA)'s programme partners.

3 With insights from the consultations and MCI agencies' regular engagements and adoption surveys with the industry and sector leads, MCI has developed an interim set of recommendations to support enterprises and workers in their digitalisation journey. The recommendations focus on four key shifts to:

- (a) Empower enterprises to be smarter in the way they work by leveraging emerging technologies;
- (b) Support enterprises to scale faster through digital solutions;
- (c) Equip enterprises to be safer by improving their cyber resilience; and
- (d) Continue investing in our workers as core enablers of digitalisation.

4 **MCI is seeking further feedback from the public, industry and TACs on these recommendations from 4 April to 22 April 2024.** The feedback received will contribute to shaping the various enterprise digitalisation initiatives going forward, and the DEB report that will be published later this year. **MCI is also seeking partners to drive collaborations and initiatives that are outlined in this consultation paper.**

Singapore enterprises have made good progress in their digitalisation journey

5 Digitalisation among enterprises has created good outcomes for Singapore and created good jobs for Singaporeans.

- a) The digital economy has generated a **value-add of \$106 billion dollars in 2022¹**, equivalent to **17%** of Singapore's nominal Gross Domestic Product (GDP). This is an increase from **13% in 2017** (Figure 1).
- b) With the demand for technology-related skills across the economy, technology-related jobs have accounted for a rising share in total employment¹ from **4.2% in 2017 to 5.2% in 2023** (Figure 2).
- c) These are good jobs for Singaporeans – university graduates of information and digital technologies courses continue to take home the highest **median monthly starting pay at \$5,500 per month**.

Figure 1. Singapore Digital Economy contribution to GDP

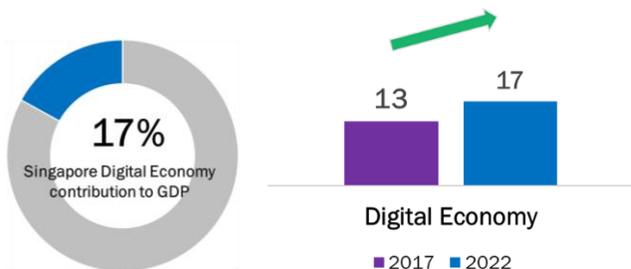
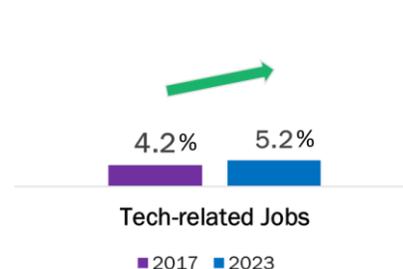


Figure 2. Technology-related Jobs share in Total Employment



6 Over the years, the Singapore Government has supported enterprises in their digitalisation journey through various programmes and schemes. For example:

SMEs GO DIGITAL

CTO as-a-Service

DATA PROTECTION ASSURED | **DATA PROTECTION ESSENTIALS**

- (a) Under SMEs Go Digital, IMDA provides SMEs with **curated digital solutions and consultancy support**, through sector-specific Industry Digital Plans and Chief Technology Officer-as-a-Service (CTOaaS)². Over 92,000 users have accessed resources from the CTOaaS platform. IMDA also empowers SMEs to grow through responsible use of data, including (i) free business intelligence tools to unlock data to generate insights (Better Data Driven Business³) and (ii) helping SMEs

¹ Source: IMDA and MOM

² <https://services2.imda.gov.sg/CTOaaS/>, <https://www.imda.gov.sg/how-we-can-help/smes-go-digital/industry-digital-plans>

³ <https://www.imda.gov.sg/bddb>

improve their data protection practices through the Data Protection Essentials⁴ and the Data Protection Trustmark (DPTM) certification⁵.

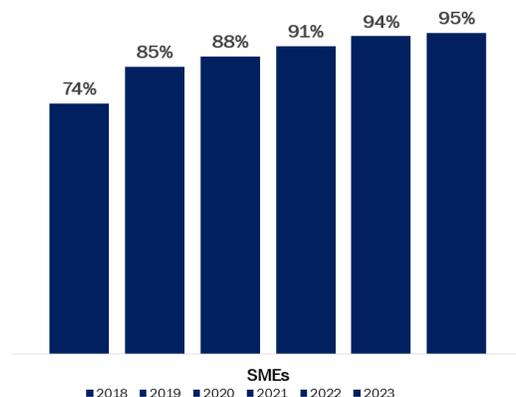


(b) CSA supports enterprises with **access to and implementation of cybersecurity solutions**, in the form of (i) cybersecurity guidelines and consultancy support through Chief Information Security Officer-as-a-Service (CISOaaS) and (ii) certifications such as Cyber Essentials and the Cyber Trust Mark⁶.

(c) Enterprise Singapore (EnterpriseSG) **supports SMEs in digitalisation and scaling their businesses** through grants and schemes such as the Productivity Solutions Grant and the Enterprise Development Grant⁷.

7 SMEs have made good progress in digitalisation. Among SMEs, the technology adoption rate has increased from **74% in 2018 to 95% in 2023** (Figure 3)⁸. More than 11,000 hawkers have benefited from the Hawkers Go Digital Programme, with more than half of them accepting digital payments and serving customers on food delivery platforms.

Figure 3. Technology Adoption among SMEs



Impetus for the next bound of digitalisation

⁴ <https://www.imda.gov.sg/dpe>

⁵ <https://www.imda.gov.sg/dptm>

⁶ <https://www.csa.gov.sg/our-programmes/support-for-enterprises/sg-cyber-safe-programme/cybersecurity-certification-scheme-for-organisation/cybersecurity-health-plan>

⁷ <https://www.enterprisesg.gov.sg/financial-support>

⁸ Percentage of firms that adopted at least one digital technology from nine categories of digital technologies, namely Cybersecurity, Cloud, E-payment, E-commerce, Data Analytics, AI, Internet of Things (IoT), Blockchain, and Immersive Media. Data collection for Blockchain and Immersive Media only commenced in 2018, as they are relatively new technologies.

8 The digital landscape is constantly evolving. Several key trends have a significant impact on our digital economy.

9 First, technologies such as Artificial Intelligence (AI) and Generative AI (“GenAI”) would have far reaching implications for industries, enterprises and workers. On one hand, these technologies have the potential to unleash vast opportunities for our businesses. Systems are becoming increasingly interconnected, which allows for greater automation, efficiency, and convenience. On the other hand, the growth in digitalisation has also exposed businesses to vulnerabilities, disruption, and the increase in cyber threats.

10 These rapid advancements in digital technologies present both risks and opportunities for our enterprises. Therefore, it is critical for Singapore to maintain our momentum in meaningful technology adoption for business efficiency and growth, while preserving digital trust as a bedrock of our competitive advantage.

11 There is opportunity to deepen our enterprise digitalisation.

(a) SMEs have a lower tech adoption intensity, leveraging on average 2 digital technologies as compared to 5 among non-SMEs.

(b) While e-payment adoption is high amongst SMEs, digital technologies such as AI, data analytics and cloud computing have wider gaps in adoption between SMEs and non-SMEs.

12 In the next bound of our enterprise digitalisation journey, **the Digital Enterprise Blueprint aims to establish Singapore as a nation of empowered enterprises and to uplift our enterprises and workers in the age of AI.** We aim to:

(a) Facilitate an environment for experimentation, unlocking new potential and capabilities through leveraging emerging technologies such as AI.

(b) Encourage SMEs to harness technology to optimise the way they work, to focus on higher value-add work such as driving business growth, customer satisfaction and innovation.

(c) Strengthen our digital resilience and cybersecurity across the ecosystem, as trust is the cornerstone of our digital economy and threat actors and landscape continue to expand and evolve.

Key shifts

13 We will continue to build on our foundation by:

- (a) **Collaborating** with sector agencies and associations to develop industry-specific digitalisation plans.
- (b) **Curating** a suite of digital solutions and services that meet the needs of the broad base of enterprises.
- (c) **Crowding** in the tech ecosystem to partner digitally matured enterprises that wish to develop more advanced solutions.

14 Building on these trends and insights, we have developed an interim set of recommendations along the following key shifts, to uplift enterprises and workers:

- (a) **Shift 1: Empower enterprises to be Smarter in the way they work.** We aim to catalyse adoption and innovation with emerging technologies through raising awareness of the benefits of technologies such as AI and facilitating access to AI-enabled solutions.
- (b) **Shift 2: Help enterprises to Scale Faster through digital solutions.** We will accelerate adoption of integrated digital solutions that can help businesses scale and bring greater value and operational efficiencies.
- (c) **Shift 3: Equip enterprises to be Safer by improving their cyber resilience and therefore strengthening trust in our digital systems.** We will strengthen enterprise digital security for a resilient digital economy, in supporting SMEs to implement cybersecurity and data protection measures.
- (d) **Enabler: Encourage enterprises to invest in skills development of workers and to adopt skills-based hiring as a core enabler.** Enterprises need to have the capabilities to harness the benefits of digitalisation and continue to invest in training and development of their workers, to upskill and reskill as part of digital transformation efforts.



Shift 1: Empower enterprises to be Smarter in the way they work.

AI

Broad based

15 We will support our enterprises and workers to access AI capabilities through the **SMEs Go Digital Programme**. Since its launch in 2017, SMEs Go Digital has been updated at various stages to cater to SMEs' evolving needs. **CTO-as-a-Service (CTOaaS)** was introduced in 2022 as a

one-stop platform for all SMEs to assess their digital health, find the right sector-specific **Industry Digital Plan (IDP)**, and access a curated suite of market-proven and cost-effective solutions. SMEs can also engage digital consultants when they require customised advice.

16 For the broad base of SMEs, we have a curated list of approximately 400 pre-approved digital solutions suitable for broad-based adoption. Currently, around 20% of these are already AI-enabled. For instance, AI capabilities are integrated into customer relationship management solutions, which can help enterprises analyse customer interactions and data to tailor marketing campaigns.

17 At the sector-level, specific **IDPs** provide SMEs with a step-by-step guide on the digital solutions to adopt at different stages of their growth. There are 22 IDPs, including sectors like Wholesale Trade, Construction, Retail and Food Services. These IDPs will be progressively refreshed with an updated solution suite, highlights on AI solutions for that sector, integrated solutions and roadmaps on Cybersecurity and Data Protection. For example, sectors such as Legal, Tourism (attractions), Retail and Security have had their IDP recently launched or refreshed.

18 To address newer developments in AI, we launched two new schemes for enterprises to gain experience using generative AI and for the development and deployment of GenAI solutions with tech partners. The first scheme is a collaboration between IMDA and EnterpriseSG, **to provide a pilot group of SMEs with access to 13 specially curated GenAI solutions for common business functions**. For solutions that are found to be useful, we will consider including them in the SMEs Go Digital pre-approved list of digital solutions, that will benefit a wider group of SMEs.

Digitally Mature

19 The second scheme launched by IMDA, is **a new initiative called Generative AI x Digital Leaders**, focused on more digitally mature enterprises that are looking to develop and deploy customised GenAI solutions within their businesses to optimise business outcomes. Here, participating enterprises will partner tech partners who would help them develop and implement these GenAI solutions. We welcome digitally mature enterprises to sign up for this initiative.

20 To better harness and reap benefits from emerging technologies and emergent areas, enterprises should be enabled with the necessary capabilities and know-how for effective deployment. For enterprises that are more ready and digitally ambitious, we will support them in a more strategic and holistic manner, partnering them to leverage digitalisation in becoming Digital Leaders. Under the **Digital Leaders programme**, willing and able enterprises from all sectors would be supported in: (a) charting their digital roadmaps that will support business growth plans; (b) building their own digital teams and in-house digital capabilities to accelerate digital transformation plans, as well as (c) embarking on digital projects that incorporate emerging technologies for productivity and growth.



Shift 2: Support our enterprises to Scale Faster through digital solutions.

21 The adoption of standalone, stove-piped solutions makes it difficult for SMEs to scale up. It is therefore important for SMEs to consider the long-term integration of their digital solutions, in ensuring seamless and effective operations and workflow as their business grows. We also want enterprises to be able to harness the full potential of digital, including deriving business insights from data analytics.

Cloud-based solutions



Broad based

22 For the broad base of enterprises, adoption of cloud-based solutions as a foundation allows them to scale more easily as needed. Cloud-based solutions, especially those built on cloud-native architecture are beneficial as they facilitate scaling, provide flexibility and are reliable and secure. Enterprises do also receive technical support embedded as a feature of these solutions and services. Today, majority of the pre-approved solutions under SMEs Go Digital Programme are cloud-enabled. We will **encourage more digital solutions to be cloud-native** for greater scalability and in keeping it cost effective for our enterprises.

Integrated Digital Solutions



Digitally Mature

23 **Integrated solutions** connect different systems for more seamless operations and aggregate data from multiple sources to derive new business insights. With integrated solutions, enterprises can start with a digital solution, and build on compatible digital solutions based on business needs and as they are ready to scale. We will step up our efforts to **include more integrated digital solutions under the SMEs Go Digital Programme**, stipulating interoperability requirements where possible for these solutions.

24 At the sectoral level, IDPs such as Food Services, Security and Retail currently have sector specific integrated digital solutions. If certain integrated solutions are not available in the market, we will curate such solutions through the **Advanced Digital Solutions scheme**. An example is the Connected Business Suite solution, which is available to Food Services SMEs. We seek your views on other integrated solutions that would be useful to include.



Shift 3: Equip our enterprises to be Safer by improving their cyber resilience and therefore strengthening trust in our digital systems.

25 In Singapore, 8 in 10 enterprises encountered at least one cybersecurity incident in a year. While enterprises are taking steps to improve their cyber hygiene, there is much more that can be done, especially in building awareness on the resources available and the knowledge on implementation of cybersecurity solutions. **We will take a three-tier approach to helping SMEs build their cyber resilience.**

26 First, we will support SMEs in taking steps to improve their cyber hygiene. We will **launch a cybersecurity health check tool** for enterprises to assess their cyber hygiene, benchmark themselves against their industry peers and access resources that will help them to plug the gaps. Those who require more support can tap on the **Chief Information Security Officer (CISO)-as-a-Service** to engage cybersecurity consultants to develop tailored cybersecurity health plans.

27 Second, we will **raise the cybersecurity standards of the digital systems** used by our enterprises. This will especially benefit SMEs with no in-house cybersecurity resources. **We will start with the pre-approved digital solutions under IMDA's SMEs Go Digital programme.** Pre-approved digital solutions that handle personal data will be required to incorporate basic data protection and security controls (e.g. encryption, backup, 2-factor authentication) to provide a base layer of protection for the personal data collected.

28 Third, we plan to **work with sector leads to develop industry-specific guidelines for cybersecurity.** In healthcare, for example, CSA worked with Ministry of Health to develop cybersecurity guidelines to improve the security posture amongst healthcare providers.

29 In the longer term, we will explore the inclusion of a minimum threshold of cybersecurity standards as a criterion for vendor selection in other government procurement of services.



Enabler: Investing in workers and skills development.

30 **Investing in skills development of workers is a core enabler, and critical to support business outcomes.** Enterprises face barriers in capturing benefits from digitalisation when their digitalisation efforts are not supported with skills development of their workers (i.e. employee training, resource management). Furthermore, difficulties in hiring and retaining tech talent, and manpower constraint are barriers to SMEs training and building workforce capability. Enterprise leadership will need to incorporate digitalisation as part of their business plans and invest in workers as part of their digital transformation.

31 Beyond including relevant sector-specific AI solutions, the refreshed and newly launched IDPs also include a **digital skills training roadmap** to better equip employees with the necessary skills to adapt to the use of digital solutions, including AI.

32 To support enterprises' demand for tech talent, we have scaled up the quantity and quality of tech talent. Over the years, we have increased the intake of Information and Digital Technologies undergraduate courses at our autonomous universities. We have also scaled up the TechSkills Accelerator (TeSA), which since 2016, has placed and trained more than 17,000 locals in in-demand tech areas such as AI and Analytics, Software and Applications, 5G, Cloud and Cybersecurity, and upskilled 231,000 individuals in tech.

Opportunities for tech reskilling and upskilling

33 To support enterprises in digitalisation, there are now 16 Jobs Transformation Maps (JTMs) that identify job roles affected by various technologies, of which 13 specifically outline the impact of AI. These JTMs provide useful signposts for employers and workers so that they can plan for job redesign or training. Under the I&C Jobs Transformation Map that was launched in September 2023 with five training partners, we have curated about 200 AI courses, and nearly 2,000 tech workers have been trained through these AI courses, as of December 2023. The trainees came from across 530 companies, of which, 30% were SMEs. Companies can approach the five appointed training partners to upskill their existing tech workers in AI, to which the training partners can develop training plans or recommend courses to meet the varied use cases in companies. In the year ahead, our JTM training partners would reach out to more SMEs in various tech and non-tech sectors through their trade associations and chambers in partnership with SCS and SGTech.

34 We also call upon our wider ecosystem, including tech services providers, trade association and industry partners to:

- (a) Refer to and help amplify awareness of existing guidelines, standards, and available industry certifications from IMDA and CSA, to drive a common understanding across enterprises.
- (b) Support enterprise skills development within the workplace, or in the context of business, such as through technical advisory and modular, 'byte-sized' training initiatives.

Adopt skills-based hiring

35 To address challenges in hiring tech workers, the government is encouraging companies to adopt skills-based hiring practices, which would help companies widen their search for tech talent. In November 2023, the TeSA for ITE and Polytechnic (TIP) Alliance launched the Skills-Based Hiring movement together with Employer Pledge and Handbook for Tech Roles which

provide practical guidance for firms to attract, assess and develop tech talent based on competencies.

36 Oracle and Accenture are examples of companies that have pledged their support and have been recruiting based on skills for their openings. Accenture adopted a rigorous multi-stage assessment focusing on skills, competencies, and growth potential, which proved to reduce Time-to-Hire by 75% and increased quality talent pipelines by 40%. We hope to see more companies coming on board.

Conclusion

37 MCI-Family invite businesses and members of the public to provide feedback to the Digital Enterprise Blueprint and its key shifts and recommendations, outlined within this document, by **22 April 2024**. Feedback should be submitted via the form here: <https://go.gov.sg/debconsultation>. Alternatively, the form can be accessed via the QR code below.



38 Please note that all submissions received may be published and attributed to the respective respondents unless they explicitly request MCI not to do so. As such, if respondent would like (i) their whole submission, or part of it, or (ii) their identity, or both, to be kept confidential, please state so in the submission. In addition, MCI reserves the right not to publish any submissions received where MCI considers it not in the public's interest to do so, such as if the submission appears to be libelous or offensive.